

the inner side cutting-point increasing slowly in size, and the former being slightly directed towards the central tooth.

A number of intermediate teeth show a gradual reduction of the reflected portion from tricuspoid to bicuspid, the median cutting-point and, more especially, the inner cutting-point increasing in length.

Marginals quadrangular, much broader than long, tridentate, the median denticle being the strongest. The eighteenth tooth sometimes with four denticles; the last with one only, rudimentary.

*Animal*.—Tail rounded, slightly tapering, with a mucous tail-gland. There is a pedal line and diagonal grooves on the sides of the foot.

*Note*.—I also examined the dentition of *Vitrina Hudsonia*, Benson, from South Africa, which proved to be a *Helicarion*, as I anticipated.

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VI.—*Preliminary Notes on the Relation between the Helicidæ of New Zealand, Tasmania, and South Africa.* By HENRY SUTER, Christchurch, New Zealand.

BEFORE entering upon the subject in question it will be necessary to say a few words as to the present classification of the New Zealand Helicidæ, which will be more or less new to most conchologists. In the "Reference List of the Land and Freshwater Mollusca of New Zealand" (Proc. Linn. Soc. N. S. W. (2) vii. p. 633) Mr. C. Hedley and the writer classed the Helices under Zonitidæ, induced by the characters of the animal—clavate eye-peduncles, distinct pedal line, diagonal grooves on the foot, and mucous tail-gland in many of them; but, in accordance with Mr. H. A. Pilsbry and Dr. von Ihering, I am now fully convinced that the New Zealand Helicidæ are really *pseudo-zonitoid* mollusks.

In 1892 I sent a collection of New Zealand land-shells to Mr. H. A. Pilsbry, and the result was his article "Observations on the Helices of New Zealand," published in 'Nautilus' (vol. vi. no. 5, p. 54). With regard to the numerous genera recognized by New Zealand conchologists the author says:—"These sections or subgenera are founded upon various modifications of the shell or jaw, but they have not sufficient distinctness to rank as genera, unless we understand that term in a much more restricted sense than it has been used by the majority of conchologists or zoologists generally." He unites

the genera which formed my family Phenacohelicidæ (Trans. New Zeal. Inst. xxiv. p. 270) in one genus, *Gerontia*, establishing, amongst others, a section *Calymna*, Hutton, for the species formerly placed in the genus *Amphidoxa*, Hutton (not Albers), and subgenus *Calymna*, Hutton. For these shells, however, the name of *Flammulina* had been proposed in 1873 by von Martens ('Critical List of New Zeal. Moll.' p. 12), and was adopted by Mr. C. Hedley and myself in our "Reference List" (l. c. p. 643). *Gerontia* should therefore be replaced by *Flammulina* as a generic name, the former dating from 1883.

Later on Mr. H. A. Pilsbry published his "Preliminary Outline of a new Classification of the Helices" (Proc. Acad. Nat. Sci. Philad. 1892, p. 387 &c.), in which he unites all the sections of his former genus *Gerontia* (including *Endodonta*, *Charopa*, &c.) in one large genus *Endodonta* (l. c. pp. 401, 402). With this I cannot agree. Mr. H. A. Pilsbry was under the impression that the New Zealand *Endodonta* and *Charopa* possess a mucous tail-gland, which is not the case. I do not attach very great importance to the presence or absence of the caudal gland, as we really do not know its true significance; but in the mollusks classed under *Flammulina* the jaw is always stegognath, the radula is more or less pseudo-zonitoid, and, besides, a mucous tail-gland is always present; whilst in *Endodonta* and *Charopa* the jaw is only striated, the radula is much more helicoid, and there is no caudal gland. Moreover, according to the geographical distribution as now known to me, the two genera *Flammulina* and *Endodonta* (including *Charopa*) belong to two different types—*Endodonta* being of *Polynesian*, *Flammulina* of *Antarctic* origin. In New Zealand the *Endodonta* stock has been immigrating from the North, the *Flammulina* forms from the South and perhaps from the West and East also, or the latter may have spread from New Zealand.

These are the reasons which induce me to separate *Flammulina* from *Endodonta*, thus forming two well-defined genera.

Following chiefly Mr. H. A. Pilsbry (l. c. pp. 401-403) I now propose the following classification of the New Zealand Helicidæ:—

#### Group Haplogona.

##### Genus 1. FLAMMULINA (v. Martens, 1873), Suter.

Sect. 1. FLAMMULINA, von Martens, 1873, s. str. (= *Amphidoxa*, Hutton, not Albers).  
Type: *F. compressivoluta*, Reeve.

Subsect. CALYMNA, Hutton, 1884.

Type: *C. costulata*, Hutton.

Sect. 2. GERONTIA, Hutton, 1883.

Type: *G. pantherina*, Hutton.

Sect. 3. PHACUSSA, Hutton, 1883.

Type: *P. hypopolia*, Pfeiffer.

Sect. 4. THERASIA, Hutton, 1884.

Type: *T. celine*, Gray.

Sect. 5. PYRRHA, Hutton, 1884.

Type: *P. cressida*, Hutton.

Sect. 6. PHENACOHILIX, Suter, 1891.

Type: *P. pilula*, Reeve.

Sect. 7. ALLODISCUS, Pilsbry, 1892 (= *Psyra*, Hutton, 1884, not Stal, 1876).

Type: *A. dimorphus*, Pfeiffer.

Sect. 8. SUTERIA, Pilsbry, 1892 (= *Patulopsis*, Suter, not Strebel, 1879).

Type: *S. ide*, Gray.

Sect. 9. THALASSOHILIX, Pilsbry, 1892 [= *Thalassia*, Hutton (? and of Albers), not *Thalassia*, Chevrolat, 1834 (Coleopt.)].

Type: *T. zelandica*, Gray.

Genus 2. ENDODONTA (Albers, 1850), Suter.

Sect. 1. ENDODONTA, Albers, 1850, s. str. (+ *Pitya*, Pease, not Beck).

Type: *E. lamellosa*, Férussac (Hawaii).

Subsect. PSYCHODON, Ancy, 1891 (= *Huttonella*, Suter, not Pfeiffer, = *Maoriana*, Suter, 1891).

Type: *P. leiota*, Hutton.

Sect. 2. CHAROPA, Albers, 1860 (= *Simplicaria*, Mousson, MS.).

Type: *C. coma*, Gray.

(a) Subsect. TESSERARIA, Böttger, 1881.

Type: *T. novoseelandica*, Pfeiffer.

(b) Subsect. AESCHRODOMUS, Pilsbry, 1892 (= *Thera*, Hutton, 1884, not Stephens, 1831).

Type: *A. stipulatus*, Reeve.

### Group Polyplacognatha.

Genus LAOMA (Gray, 1849), Pilsbry, 1892.

Sect. 1. LAOMA, Gray, 1849, s. str.

Type: *L. leimonias*, Gray.

Sect. 2. PHRIXGNATHUS, Hutton, 1883.

Type: *P. Mariæ*, Gray.

We can now proceed to the investigation of the *Tasmanian* land-molluscan fauna. Having for several years regarded the *Tasmanian* Helices as nearly allied to those of *New Zealand*, I was much pleased to find that Mr. H. A. Pilsbry held a similar opinion with regard to *Patula*, *Paryphanta*, *Rhytida*,

&c. ('Nautilus,' 1892, vi. p. 57). On looking through my collection of Tasmanian land-shells I fortunately found many specimens containing the dried-up animal, and these I decided to sacrifice to enable me to examine the dentition. Moreover, a short time ago Mr. W. L. May kindly assisted me by forwarding some living snails from Tasmania.

In giving the classification of some of the Tasmanian land-shells, I wish to point out that it is based on the dentition as well as on the shell-characters. The descriptions and figures of the dentition of the species will be published occasionally. The dentition of the following thirty-two species was examined:—

Genus FLAMMULINA (v. Mart.), Suter.

Sect. FLAMMULINA, von Martens, s. str.

- (1) *F. Jungermannia*, *Petterd.* (3) *F. Luckmani*, *Brazier.*  
 (2) *F. sitiens*, *Cox.*

Sect. GERONTIA, Hutton.

- (4) *G. albanensis*, *Cox.* (10) *G. tasmaniae*, *Cox.*  
 (5) *G. stanleyensis*, *Petterd.* (11) *G. subrugosa*, *Brazier.*  
 (6) *G. Legrandi*, *Cox.* (12) *G. Mathinnae*, *Petterd.*  
 (7) *G. Marchiannae*, *Cox.* (13) *G. Macdonaldi*, *Cox.*  
 (8) *G. diemenensis*, *Cox.* (14) *G. Bassi*, *Brazier.*  
 (9) *G. gadensis*, *Cox.* (15) *G. tamarensis*, *Petterd.*

Sect. PHACUSSA, Hutton.

- (16) *P. Savesi*, *Petterd.* (18) *P. Hamiltoni*, *Cox.*  
 (17) *P. Stephensi*, *Cox.*

Sect. ALLODISCUS, Pilsbry.

- (19) *A. limula*, *Cox.*

Sect. THALASSOHELIX, Pilsbry.

- (20) *T. Fordei*, *Brazier.*

Genus ENDODONTA (Albers), Suter.

Sect. CHAROPA, Albers.

- (21) *C. antialba*, *Beddome.*

Genus LAOMA (Gray), Pilsbry.

Sect. PHIRINGNATHUS, Hutton.

- (22) *P. Weldii*, *Tenison-Woods.* (26) *P. pictilis*, *Tate.*  
 (23) *P. casus*, *Cox.* (27) *P. pipaensis*, *Petterd.*  
 (24) *P. Henryana*, *Petterd.* (28) *P. Halli*, *Cox.*  
 (25) *P. furneauxensis*, *Petterd.* (29) *P. Hobarti*, *Cox.*

Genus RHYTIDA, Albers.

- (30) *R. Sinclairi*, *Pfeiffer.* (31) *R. ruga*, *Cox.*

Genus RIENEAE, Hutton.

- (32) *R. nelsonensis*, *Brazier.*

It is a most astonishing fact how close the relation between the Tasmanian and New Zealand molluscan fauna really is, more so than I ever anticipated. Of nine sections of the genus *Flammulina* occurring in New Zealand, five are represented in Tasmania. Most remarkable is the preponderance of *Gerontia*, a section represented in New Zealand by two species only, and of *Phrixgnathus*, which is also well represented in New Zealand. A very striking feature is the almost total absence of *Endodonta*, the Polynesian element, there being only one species of *Endodonta*, s. str., and one of *Charopa* known from Tasmania. *Rhytida* is more abundant in Tasmania, whilst *Rhenea* is represented by two species in each country.

With regard to the relation between the land molluscan fauna of New Zealand, Tasmania, and *South Africa*, I do not know much at present; yet the little knowledge available seems of great importance. The genus *Ærope* is no doubt nearly allied to *Rhytida*; but the most important fact has been brought to our knowledge by the examination of the dentition and part of the animal of *Pella Burnupi*, M. & P. The authors of this species state that it is of allied character to *P. biscalpta*, Benson, the type of *Pella*, and the dentition given may therefore be taken as typical for the section or genus. I have studied the dentition of most of the New Zealand land and freshwater shells, and, as shown above, of a good many from Tasmania, and I may therefore be allowed to give my opinion as to the systematic position of *Pella Burnupi*, M. & P., and *Pella* generally. I have not the slightest doubt that it must be classed under *Haplogona* next to *Flammulina*.

The dentition and part of the animal which I was able to examine closely resemble those of *Flammulina*, s. str., and *Gerontia* from New Zealand and Tasmania; and I think that the South-African genus *Pella* belongs to the *Antarctic* molluscan fauna, which no doubt dates back to the Cretaceous period at least.

There are other South-African land-shells which seem to me to be more or less closely allied to forms from New Zealand, and I hope to obtain the animals for examination.

[With regard to the genus *Pella*, as alluded to in the above article, we would refer our readers to the remarks made by Mr. Pilsbry in the 'Manual of Conchology,' vol. viii. pp. 135 *et seq.*—Eds. *Ann. & Mag. Nat. Hist.*]